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Research Yields Clues on Blood Disease Caused by Worms in Tropical Climates

SCHISTOSOMES, or blood flukes, infest from 100 million to 200 million people in tropical areas from Puerto Rico to Egypt to Thailand.

The worms lay eggs that pass out in human feces, which must then be taken up by water snails to produce the larval stages that infect men by burrowing into the skin. The distribution of schistosome disease thus follows closely on poor sanitation coupled with exposure to waters in which the snails breed.

The history of the worms in the body is not a pretty story. The mature parasites live within the larger veins, where they do surprisingly little direct harm. But the eggs migrate through the liver or bowel or urinary tract, depending on the particular species of worm. The irritation of these organs by the eggs leads to widespread debilitating disease.

The parasite shows its successful adaptation to man by only occasionally killing its host. For a national economy, however, such an ailment is a more serious and insidious burden than diseases with more dramatic, rapid lethal effects. According to experts of the World Health Organization, schistosome disease vies with malaria as the world's pre-eminent public health problem.

THE ORGANIZATION also characterizes the disease as peculiarly man made, for it follows upon irrigation projects that provide year-round waters in which the snails can thrive. Many ecologists have warned, for example, that Egypt's Aswan High Dam now being completed may cost far more in schistosome disease than it can benefit in agricultural progress.

In similar situations, WHO reports have commented that "despite continual advice given by the Health Department, irrigation schemes are planned and developed without due consideration of the health aspects. . . . Unless the danger is realized at the outset, and plans for prevention made . . . large irrigation schemes may well wreck the health of the country and bring the most grandiose schemes to a pitiful end."

SCHISTOSOME researchers have long been puzzled by the ability of the mature worms to live in the bloodstream for many years without provoking an immunological reaction. Recently, several research groups have found that the worms practice a kind of immunological camouflage, for they carry substances on their skin similar to those of their animal host.

Drs. S. R. Smithers and R. J. Terry of the National Institute of Medical Research in London, have now found that these substances are probably assimilated from the host tissue, rather than made by the worm. After a few weeks of life in a new host, the worms shed their old identity and acquire one to match their present host. Worms grown in mice could be transferred to monkeys, for example, but would be rejected if the monkeys had been previously immunized against mouse tissue cells.

To learn how the worm incorporates these surface materials from host cells into its own skin would, obviously, be of great interest to studies of organ transplantation, for these grafts face a similar problem. We could also imagine the breeding of domesticated strains of blood flukes to accomplish medically desirable changes without immunological rejection. More appropriately to the present world problem, the findings suggest that people might be vaccinated against schistosome infection with material from the snails that transmit the disease.

RECENT PROGRESS can also be reported for a promising new drug against the worms, now in the process of large-scale trials. Lucanthone was discoyered by Sterling-Winthrop scientists as a metabolic product found in the urine of patients treated with an earlier, less satisfactory drug, hycanthone. For commercial production, the conversion of hycanthone into lucanthone was accomplished by a mold specifically sought for the purpose. Whether the drug can be realistically useful in an economically and socially retarded country cannot yet be foretold; this one has the advantage of requiring only one injection for a good chance of cure.

Other fascinating approaches follow the observation that mice bedded on cedar shavings are resistant to infection. Further work has led to the isolation of active, pure compounds from essential oils. A certain amount of work is also devoted to biological predators either of the snails or the larvae in natural waters.

All in all, the research effort devoted to schistosome disease is pitifully small compared to its human importance, but it is beginning to respond to basic scientific approaches. This work (as always) is also returning some fascinating dividends in basic biology.